School Absenteeism as a Perpetuating Factor of Functional Somatic Symptoms in Adolescents

Janssens, Karin; Oldehinkel, Tineke; Dijkstra, Jan; Veenstra, René; Rosmalen, Judith

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School Absenteeism as a Perpetuating Factor of Functional Somatic Symptoms in Adolescents: The TRAILS Study

Karin A. M. Janssens, MSc, Albertine J. Oldehinkel, PhD, Jan Kornelis Dijkstra, PhD, René Veenstra, PhD, and Judith G. M. Rosmalen, PhD

Objective To examine whether school absenteeism is a perpetuating factor of functional somatic symptoms and whether this holds true for bullied adolescents.

Study design This study is part of the longitudinal population-based study Tracking Adolescents' Individual Lives Survey. Data from assessment wave 2 (n = 2149; 51.0% girls; mean age = 13.65, SD = 0.53) and assessment wave 3 (n = 1816; 53.3% girls; mean age = 16.25, SD = 0.72) were used. Peer victimization was assessed by peer nominations, school absenteeism by both parent and teacher reports, and functional somatic symptoms with the Youth Self-Report.

Results With structural equation modeling, school absenteeism at the second wave, adjusted for functional somatic symptoms at the second wave, was revealed to predict functional somatic symptoms at the third wave in the entire cohort (β = 0.12; 95% CI, 0.02-0.22), but not in the subgroup of bullied adolescents (β = −0.13; 95% CI, −0.62-−0.26). However, the difference between bullied and unbullied adolescents did not reach significance.

Conclusion This study provides evidence that school absenteeism is a perpetuating factor of functional somatic symptoms in adolescents. A clinical intervention study is necessary to examine whether preventing school absenteeism truly helps to reduce functional somatic symptoms in adolescents. *(J Pediatr 2011;159:988-93)*.

Functional somatic symptoms cannot be fully explained by a known medical condition. Functional somatic symptoms are common during adolescence; approximately 25% of adolescents sustain chronic or recurrent pain,[1] and approximately 10% of adolescents are chronically fatigued.[2] Functional somatic symptoms are a burden for the child and the family[3]; adolescents experiencing functional somatic symptoms frequently miss school,[4-7] and their symptoms contribute to high health care costs.[8] More insight into the etiology of this important health problem might aid the development of effective prevention and intervention strategies.

It is unknown whether school absenteeism has a disadvantageous effect on the course of functional somatic symptoms. School absenteeism might have such an effect, because when adolescents with functional somatic symptoms stay home from school, they have less distraction from their functional somatic symptoms and may become more focused on them. Focusing on physical symptoms heightens the intensity of these symptoms.[9] In this way, school absenteeism might be a perpetuating factor of functional somatic symptoms.

If school absenteeism turns out to indeed be a perpetuating factor of functional somatic symptoms, the question remains whether this holds true for all adolescents. School absenteeism might not be a perpetuating factor of functional somatic symptoms in adolescents who are freed from symptom triggers when staying home. A possible symptom trigger is being bullied, because being bullied is a heavy stressor for adolescents[10] and has a negative influence on the development of functional somatic symptoms.[11,12] By allowing the adolescent to be freed from being bullied, school absenteeism may have an advantageous effect on the course of functional somatic symptoms in bullied adolescents, which may mitigate the presumably disadvantageous effect of becoming more focused on functional somatic symptoms when staying home. Therefore, school absenteeism may not have a perpetuating effect on functional somatic symptoms in bullied adolescents.

We thus hypothesized that school absenteeism has a disadvantageous effect on the course of functional somatic symptoms in adolescents and that this does not hold true for bullied adolescents. We used longitudinal data from a general population of adolescents and their classmates to examine our hypotheses.

CFI	Comparative fit index
T2	First follow-up assessment
T3	Third assessment wave
TLI	Tucker-Lewis index
TRAILS	Tracking Adolescents' Individual Lives Survey
YSR	Youth Self-Report

From the Interdisciplinary Center for Psychiatric Epidemiology and Graduate Schools for Behavioral and Cognitive Neurosciences and for Health Research, University Medical Center Groningen (K.J., A.O., J.R.), and Department of Sociology and Interuniversity Center for Social Science Theory and Methodology (J.D., R.V.), University of Groningen, Groningen, The Netherlands; and Department of Psychology, University of Turku, Turku, Finland (R.V.)

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Methods

This study is part of the Tracking Adolescents' Individual Lives Survey (TRAILS). TRAILS is a prospective cohort study of Dutch adolescents. The study was approved by the Dutch Central Committee on Research Involving Human Subjects. The study reported here involves data from the second and third assessment wave of TRAILS, which ran from September 2003 to December 2004 and from September 2005 to August 2008, respectively. Data from the first wave were not used, because the assessments of peer victimization and school absenteeism were less extensive during this wave, and because most of the cohort switched schools between the first and the second assessment wave.

TRAILS participants were selected from 5 municipalities in the north of the Netherlands, including both urban and rural areas. All children born between Oct 1, 1989, and Sep 30, 1990, (first two municipalities) or Oct 1, 1990, and Sep 30, 1991, (last 3 municipalities) were eligible for inclusion, provided that their schools were willing to co-operate and that they were able to participate in the study. More than 90% of the schools, accommodating 3145 children, agreed to participate in the study. A small proportion (6.7%) of these children was excluded because of mental or physical incapability or language problems. Of the remaining 2935 children, 2230 (76.0%; mean age, 11.09 years; SD = 0.56 years; age range, 10-12 years; 50.8% girls) were enrolled in the study (ie, both child and parent agreed to participate). Teacher reports, which were available for 40.7% of the non-responders, revealed that they did not differ from responders in the prevalence of problem behavior nor in associations between sociodemographic variables and mental health outcomes, but non-responders were more likely to be boys, to have a low socioeconomic background, and to perform poorly at school.[13] Parents' and adolescents' written informed consent was obtained after the procedures had been fully explained.

Of the 2230 baseline participants, 96.4% (n = 2149; mean age, 13.65 years; SD, 0.53 years; 51.0% girls) participated in the first follow-up assessment (T2), which was held 2 to 4 years after assessment wave 1 (mean number of months, 29.44; SD, 5.37; range, 16.69-48.06). At the third assessment wave (T3), which was held 2 to 4 years after T2, the response was 81.4% (n = 1816; mean age, 16.25 years; SD, 0.72 year; 53.3% girls). Attrition to follow-up at T2 and T3 was not related to functional somatic symptoms at preceding assessment (results available upon request).

Measures

Functional somatic symptoms were assessed at T2 and T3 with the Somatic Complaints Scale of the Youth Self-Report (YSR),[14] which is known to be a valid and reliable instrument.[15,16] This scale contains 9 items referring to somatic complaints without a known medical cause (aches/pains, headaches, nausea, eye problems, skin problems, stomachache, and vomiting) or without obvious reason (overtiredness and dizziness). The adolescents could indicate whether they experienced these complaints on a 3-point scale, with 0 = never, 1 = sometimes or a little bit, 2 = often or a lot. Factor analysis indicated that two items (eye problems and skin problems) had low factor loadings at both assessment waves in both boys and girls, suggesting that these items did not represent the underlying construct well in our sample. These items therefore were excluded. The remaining 7 items, which were combined in a sum score, showed good internal consistency (Cronbach α at T2: 0.77 and at T3: 0.76).

School absenteeism was assessed with both the teacher and a parent (usually the mother) as informants. The question used to measure school absenteeism at T2 was: "How often has this pupil/your child been absent from school during the past six months because of illness?" The responses were grouped into 6 categories: "never," "1 day," "2-3 days," "4-6 days," "7-9 days," and "10 or more days." The correlation between parent and teacher report was moderate (r = .38). To get the most accurate estimate of school absenteeism, we composed a latent factor of school absenteeism reported by the teacher and the parent.

Peer victimization was assessed at T2 by peer nominations. An earlier study within TRAILS has shown that peer nominations are a valid and reliable way to assess peer victimization.[17] Peer nominations were performed in classes with at least 3 TRAILS participants, that is, 172 classes in 34 schools, in first grade (72 classrooms) and second grade (100 classrooms) of secondary education. The classrooms were evenly divided by educational track: low (60 classrooms), middle (53 classrooms), and high (59 classrooms). Of all 3672 adolescents who were approached to participate, 90.2% completed the peer nomination assessment (for details, see elsewhere[18]). So 3312 adolescents (1675 boys, 1637 girls) participated, including 1078 regular TRAILS participants. Age, sex, and functional somatic symptoms at T2 in this subsample of 1078 participants did not differ significantly from those of the other TRAILS participants. Participants received a list of all classmates and were asked to indicate whom in their classroom they were bullying. The number of nominations they could make was unlimited, but they were not required to nominate anyone. The proportion of classmates by whom adolescents were bullied was computed (for details see elsewhere[19]). Adolescents who were nominated by at least one of their classmates were considered bullied adolescents, resulting in 235 bullied adolescents (21.8%). Measures on the basis of peer nominations are potentially more reliable and valid than self-reports, because peer nominations reflect the aggregate of all the nominations a person received from others.[20,21]

Statistical Analyses

Because not all data was normally distributed, Spearman correlations and bootstrapping procedures were used. Spearman partial correlations were calculated for all variables, adjusting for sex, with SPSS software version 18 (SPSS Inc, Chicago, Illinois). To test our hypotheses, the data were fitted to the structural equation model presented

in Figure, A, with Mplus version 6 (Muthén & Muthén, Los Angeles, California). Our first hypothesis, that school absenteeism perpetuates functional somatic symptoms, was tested with a bias-corrected bootstrapping procedure. A total of 1000 resamples with the same sample size as our study sample (n = 2230) were randomly drawn with replacement. So, although each resample will have the same number of elements as the original sample, some adolescents were included in a specific resample several times, whereas other adolescents were not included, and so the 1000 samples were likely to randomly depart from the original sample. The effect of school absenteeism at T2 on functional somatic symptoms at T3 was calculated for each resample. Thereafter, the mean and the 95% CI of these 1000 effect estimates were calculated. The effect was considered significant when the 95% CI did not cross zero. Our second hypothesis, that school absenteeism is not a perpetuating factor of functional somatic symptoms in bullied adolescents, was tested by repeating the procedure for the subgroup of 235 adolescents who were bullied by at least one of their classmates. We tested whether the association between school absenteeism at T2 and functional somatic symptoms at T3 differed significantly between bullied and unbullied adolescents by performing a subgroup analysis for bullied and for unbullied adolescents in the subpopulation of 1078 adolescents who participated in the classmate reports. Group differences were examined by testing (χ^2 difference test) whether the model fit worsened significantly when the relation between school absenteeism at T2 and functional somatic symptoms at T3 was constrained to be the same in the group of bullied and unbullied adolescents. Model fits were considered good when the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were >0.95, and the root mean square error of approximation was <0.05.[22] Ideally, the χ^2 should be nonsignificant ($P > .05$) also, but in sample sizes >200 a non-significant χ^2 is generally considered to be too conservative.[18] To examine whether our results were biased because of missing data (Table I for the number of valid data), a multiple imputation approach was used.[23,24] Mplus performed all analyses on 10 imputed databases and computed average estimates. The results turned out to be essentially the same for imputed and non-imputed data, suggesting that the missing data did not bias our results. We report the results of non-imputed data, because it is not possible to acquire CIs for imputed data in Mplus. All analyses were adjusted for sex, because functional somatic symptoms, peer victimization and school absenteeism are known to be sex-dependent.[19,25,26]

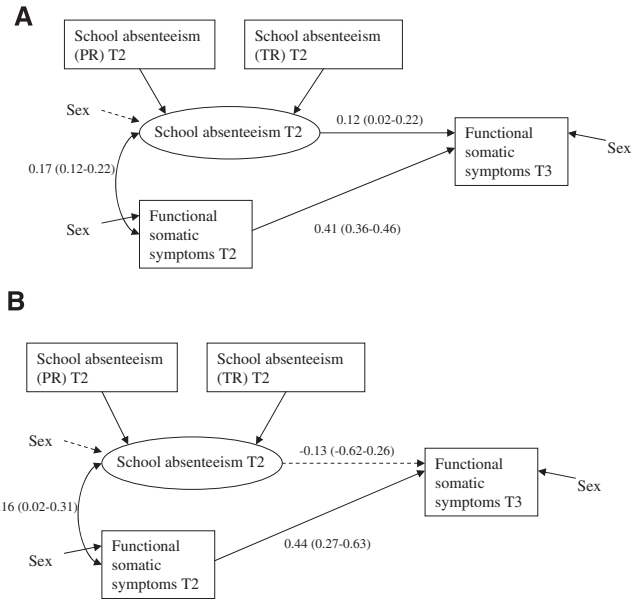

Figure. School absenteeism and functional somatic symptoms in **A,** the entire cohort and **B,** bullied adolescents. *PR,* Parent report; *TR,* teacher report. Bias-corrected bootstrap path coefficients and 95% CI (of standardized data) are given. *Dotted lines* indicate non-significant paths.

Results

Descriptive statistics were computed for functional somatic symptoms and school absenteeism (Table I). Functional somatic symptoms decreased during follow-up (Table I). School absenteeism as reported by the teacher was higher than school absenteeism as reported by the parent (Table I). The proportion of classmates by whom adolescents were bullied at T2 ranged from 0 to 0.44. School absenteeism as reported by the parent and the teacher at T2 were associated with functional somatic symptoms at T2 and T3 (Table II). Peer victimization at T2 was related to school absenteeism as reported by the teacher at T2, but not with school absenteeism as reported by the parent at T2 (Table II). Associations between peer victimization at T2 and functional somatic symptoms at T2 and T3 failed to reach significance ($P > .05$).

School Absenteeism and Functional Somatic Symptoms in the Entire Cohort

The model of functional somatic symptoms and school absenteeism had excellent model fits (χ^2; [df = 2] = 1.4,

Table I. Descriptive statistics of school absenteeism and functional somatic symptoms

Measure	Valid n	Mean (SD)	Range
Functional somatic symptoms T2*	2015	2.7 (2.5)	0-13
Functional somatic symptoms T3*	1636	2.4 (2.4)	0-12
School absenteeism (PR) T2†	1918	2.3 (1.3)	0-5
School absenteeism (TR) T2†	1440	3.0 (1.4)	0-5

PR, parent report; *TR*, teacher report.
*Sum score of 7 functional somatic symptoms, each rated on a 3-point scale (0 = never, 1 = sometimes or a little bit, 2 = often or a lot).
†Absence during the past 6 months because of illness (0 = never, 1 = 1 day, 2 = 2-3 days, 3 = 4-6 days, 4 = 7-9 days, 5 = ≥10 days).

Table II. Spearman partial correlations between functional somatic symptoms, school absenteeism, and peer victimization

	School absenteeism (PR) T2	School absenteeism (TR) T2	Functional somatic symptoms T2	Functional somatic symptoms T3	Peer victimization T2
School absenteeism (PR) T2	1.00				
School absenteeism (TR) T2	.38*	1.00			
Functional somatic symptoms T2	.15*	.13*	1.00		
Functional somatic symptoms T3	.12*	.09*	.40*	1.00	
Peer victimization T2	.01	.10*	.06	.05	1.00

*P <.01, all correlations are adjusted for sex.

P = .47; CFI = 1; TLI = 1; root mean square error of approximation <0.01). Path analyses showed that functional somatic symptoms at T2 were associated with school absenteeism at T2 (**Figure**, A). Furthermore, school absenteeism at T2 predicted functional somatic symptoms at T3, when adjusted for functional somatic symptoms at T2. This finding suggests that school absenteeism is, to some extent, a perpetuating factor of functional somatic symptoms. Results did not significantly differ for boys and girls ($\Delta\chi^2$ = 0.23 [Δdf = 1], P = .63).

School Absenteeism and Functional Somatic Symptoms in Bullied Adolescents

In bullied adolescents, school absenteeism at T2 did not predict functional somatic symptoms at T3 (**Figure**, B). This suggests that school absenteeism does not perpetuate functional somatic symptoms in bullied adolescents. This model still had excellent model fits (χ^2 [df = 2] = 1.9, P = .38; CFI = 1; TLI = 1), probably because of the significant relations between functional somatic symptoms at T2 and school absenteeism at T2 and functional somatic symptoms at T2 and functional somatic symptoms at T3, and sex effects. When we modeled the relationship between school absenteeism at T2 and functional somatic symptoms at T3 to be the same in bullied and unbullied adolescents, the model fit did not significantly worsen ($\Delta\chi^2$ = 0.62 [Δdf = 1], P = .43).

Discussion

This study provides evidence that school absenteeism is a perpetuating factor of functional somatic symptoms in adolescents, because we found that school absenteeism at T2 predicted functional somatic symptoms at T3 after adjusting for functional somatic symptoms at T2. We did not find evidence for such a perpetuating effect in bullied adolescents, although we should be careful when interpreting this result because the effect of school absenteeism on functional somatic symptoms found in bullied adolescents did not significantly differ from the effect found in unbullied adolescents. An explanation for the finding that school absenteeism is a perpetuating factor of functional somatic symptoms is that adolescents become more focused on their functional somatic symptoms when staying home from school and thereby experience more or more severe functional somatic symptoms. This explanation is consistent with a randomized controlled trial that showed that the effect of graduated exercise therapy on functional somatic symptoms is partially explained by a reduction in focusing on functional somatic symptoms.[27] The finding that school absenteeism perpetuates functional somatic symptoms in adolescents might explain our earlier finding that parental overprotection predicts the development of functional somatic symptoms in adolescents[28] when overprotective parents keep their children home from school more often than non-overprotective parents. However, the perpetuating effect of parental overprotection on functional somatic symptoms was not mediated by school absenteeism (results available on request). One could speculate that having overprotective parents is not associated with school absence because overprotective parents are not only concerned about their children's health, but also about their school performance.

There are several important strengths of this study. We used a large population-based cohort, which increases the generalizability of our findings. Further, we assessed peer victimization by peer nominations. Earlier studies that examined the relationship between peer victimization and functional somatic symptoms used self-reports. Self-reports might have overestimated the relationship between functional somatic symptoms and peer victimization, because some respondents have a tendency to report higher on questionnaires than others. Such overestimation could be indicated by our finding that peer victimization as assessed with classmate reports was not significantly associated with functional somatic symptoms at baseline and follow-up. Furthermore, we used longitudinal data, which enabled us to show that school absenteeism is likely a perpetuating factor of functional somatic symptoms. A final strength is that we gathered information about school absenteeism from both the parent and the teacher. Presumably, this gave a more accurate estimation of adolescents' school absenteeism than single-informant data. That teachers did not report exactly the same as the parent when asked about school absenteeism, was reflected in the finding that school absenteeism as reported by the teacher was correlated with peer victimization, whereas school absenteeism as reported by the parent was not.

Despite these strengths, we have to mention several limitations. First, the model we used is a simplification of the complex reality behind the etiology of functional somatic symptoms. We only address the roles of school absenteeism

and peer victimization in our models, whereas the amount of factors involved in the development of functional somatic symptoms is extensive.[29] However, we believe that inclusion of more factors that are potentially involved in the development of functional somatic symptoms would have increased the risk of chance findings and diminished the comprehensibility of our results. Second, school absenteeism was measured with both parent and teacher report. These assessments might have suffered from report bias because parents and teachers had to remember how many days their child or student had been absent during the past 6 months, which is a long period. School records would have provided more accurate information about absences, but were not available in our study. The inaccurate measurement of school absenteeism might be one of the reasons why the associations we found were only small. Third, functional somatic symptoms were measured with the YSR, therefore we are not sure that the functional somatic symptoms were not the result of conventional medical conditions. However, the factor analysis showed that we were measuring one underlying construct. In addition, the YSR explicitly stated that the symptoms had to occur without a medical cause or without an obvious reason. Another shortcoming of the YSR is that no information about impairment caused by the functional somatic symptoms is obtained, which makes it difficult to assess the severity and clinical relevance of the symptoms. A final limitation is that we performed the peer nominations in approximately half the sample. Therefore the group of bullied adolescents was small, so it is not possible to rule out that the lack of a perpetuating effect of school absenteeism on functional somatic symptoms found in bullied adolescents was caused by a lack of power. To diminish this power problem, the analyses were repeated in the group of adolescents who self-reported on one of the questionnaires that they had been bullied at school during the past 2 years. Results in this group of 450 bullied adolescents were comparable with the results in the 235 bullied adolescents identified with peer nominations. This increases the robustness of our findings.

Because we performed our study in a general population in which the mean levels of functional somatic symptoms and school absenteeism were low, only few adolescents may have had severe functional somatic symptoms. Our study is, therefore, more of theoretical than of clinical importance. Clinical intervention studies are needed to examine whether stimulating adolescents with severe functional somatic symptoms to go back to school leads to a better prognosis of functional somatic symptoms. We have shown that school absenteeism is not likely to perpetuate functional somatic symptoms in bullied adolescents. School absenteeism might also not perpetuate functional somatic symptoms in adolescents who experience other stressors at school associated with functional somatic symptoms, for example low school performance,[7] fear of failure,[30] or sexual abuse.[31] Therefore, future research is needed to unravel, whether for adolescents who are dealing with school stressors, an intervention might be better focused on solving the problems experienced at school, before focusing on reducing school absenteeism. ■

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Reprint requests: Karin A.M. Janssens, MSc, Interdisciplinary Center for Psychiatric Epidemiology, CC 72, University Medical Center Groningen, PO Box 30001, 9700 RB, Groningen, The Netherlands. E-mail: k.a.m.janssens@med.umcg.nl

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Appendix

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